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APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/872,110	06/01/2001	Ashish Shah	04645.0875	7020

7590 06/27/2003

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EXAMINER
CLEVELAND, MICHAEL B

ART UNIT	PAPER NUMBER
1762	4

DATE MAILED: 06/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/872,110	Applicant(s) SHAH ET AL.	
	Examiner Michael Cleveland	Art Unit 1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) *20-38* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 June 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-19, drawn to a ruthenium-compound coated substrate, classified in class 428, subclass 556.

II. Claims 20-38, drawn to a method of coating, classified in class 427, subclass 226.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed may be made my another and materially different method such as by ultrasonically spraying a solution of a ruthenium-containing compound onto a substrate and allowing it to dry at room temperature.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

5. During a telephone conversation with Michael Scalise on 6/12/2003 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-19. Affirmation of this election must be made by applicant in replying to this Office action. Claims 20-38 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Drawings

7. Color photographs and color drawings are acceptable only for examination purposes unless a petition filed under 37 CFR 1.84(a)(2) is granted permitting their use as acceptable drawings. In the event that applicant wishes to use the drawings currently on file as acceptable drawings, a petition must be filed for acceptance of the color photographs or color drawings as acceptable drawings. Any such petition must be accompanied by the appropriate fee set forth in 37 CFR 1.17(h), three sets of color drawings or color photographs, as appropriate, and an amendment to the first paragraph of the brief description of the drawings section of the specification which states:

> The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the U.S. Patent and Trademark Office upon request and payment of the necessary fee.

Color photographs will be accepted if the conditions for accepting color drawings have been satisfied.

Claim Interpretation

8. From MPEP 2113:

> PRODUCT-BY-PROCESS CLAIMS ARE NOT LIMITED TO THE MANIPULATIONS OF THE RECITED STEPS, ONLY THE STRUCTURE IMPLIED BY THE STEPS
> "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).
>
> The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. See, e.g., *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979).

9. The specification indicates that the deposition of particles having been formed from an ultrasonically generated aerosol of a ruthenium-containing compound deposits a porous layer of the compound on the substrate (see p. 10, lines 14-23). Applicant asserts that the use of ultrasonic generation of the aerosol allows the generation of "particles on the order of microns to submicrons" (p. 3, lines 14-22), but indicates that the spray is capable of providing particles of

about 0.1 to 100 microns (p. 6, lines 1-14). Accordingly, the use of an "ultrasonically generated aerosol" has been interpreted to refer to any aerosol particle size capable of being generated by an ultrasonic nozzle, and is inclusive of particles within the disclosed range of 0.1-100 microns. The compound may be converted to an oxide, and may contain oxides of other metals (see p. 10, lines 18-33 and claims 2).

Applicant discusses the criticality of the use of a solvent devoid of alcohol at p. 11, line 28-col. 12, line 18. However, the only structural effect asserted in this passage is that the *substrate temperature during deposition* affects diffusion of ions into the substrate. Thus, the effects asserted in this passage are results of the substrate temperature during deposition, and not of the use of any particular solvent because there is no *necessary* link between the solvent and the substrate temperature. The solvent does not remain in the final product. Therefore, the use of a solvent devoid of alcohol in the method step has not been shown to result in any necessary structure in the product.

Claim Objections

10. Claim 18 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The product-by-process of claim 1 states that the process uses "ultrasonic waves". Dependent claim 18 states that the waves have a frequency of 20,000 Hz and above. However, Applicant states at p. 6, lines 22-24 that "ultrasonic" is understood in the art as meaning frequencies of 20,000 Hz and above. Therefore, claim 18 does not further limit parent claim 1.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1-4, 7-16, and 18-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Tong et al. (U.S. Patent 5,464,453, hereafter '453).

'453 teaches

a) a substrate of a conductive metal (col. 5, lines 48-54; col. 6, lines 6-8); and

b) a coating of a metal-containing compound provided on a surface of the substrate, wherein the coating has been formed by ultrasonic spraying of the metal-containing compound in an alcohol solvent (col. 6, line 40-col. 7, line 9) (i.e., the coating comprises particles having been formed from an ultrasonically generated aerosol of the metal-containing compound contacted with the substrate.) The particular metal may be ruthenium (col. 5, line 55-64; Example 4). '453 does not teach that the solvent is alcohol-free. However, as stated above under the heading "Claim Interpretation", Applicant's specification does not reveal any structural features caused by the choice of solvent. While Applicant's comments imply that the choice of an alcohol solvent requires the use of a substrate temperature less than the flash point (e.g., 53 °F for isopropanol), '453 states that the substrate temperature during spraying of the solution may be from 0-150 °C (col. 6, lines 49-col. 7, line 9).

Claims 2-4: The initial coating is of the metal chloride, followed by pyrolysis to convert it to a final coating of metal oxide (col. 6, lines 53-55; col. 5, lines 55-64). Both the initial and final coatings satisfy claim 2; the initial coating satisfies claims 3-4.

Claim 7-9: The coating may contain combinations of metal oxides (col. 5, lines 55-64), such as ruthenium and tantalum (Example 3).

Claim 10: The metal oxide layer has a thickness between about 0.1-100 microns (1000 Angstroms-0.1 mm) (col. 4, lines 8-9).

Claim 11: The Examples coat titanium and zirconium sheets.

Claim 12: The examples demonstrate substrate thickness of approx. 1 mil (0.0254 mm).

Claims 13-16: The substrate may be roughened prior to coating by methods such as acid etching with HCl or HF or else plasma etching/cleaning (col. 6, lines 10-35), thereby increasing the conductive substrate surface area.

Claim 18: In the specification, p. 6, line 21-24, Applicant states that "ultrasonic" is recognized in the art as meaning frequencies of 20,000 Hz and above.

Claim 19: '453 is silent as to the atmospheric pressure while spraying. However, Applicant does not describe any structural elements which arise from the claimed pressure range (see p. 16, lines 1-11). Therefore, the ultrasonically sprayed coating of the prior art appear

appears to be identical to the claimed coating regardless of the atmospheric pressure during spraying.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. Claims 5 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tong '453 and in view of Spitz et al. (U.S. Patent 3,840,391, hereafter '391).

'453 teaches the use of ultrasonic spraying of a precursor solution to form a high-surface area metal oxide layer, as described above. It is silent as to the diameter of the particles formed by the ultrasonic spraying and to the atmospheric pressure while spraying. Thus, it does not teach a particle diameter of less than about 10 microns nor a pressure of at least about 600 mmHg.

'391 teaches that ultrasonic spraying may be used to produce more uniform films by providing a narrower distribution of aerosol particle diameters than other spraying methods (col. 1, lines 13-67). Typical mean particle sizes are on the order of a few (e.g., 2-3) microns (col. 3, lines 6-24). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the ultrasonic spraying method of '453 to generate particles of a few microns in order to have made the film more uniform.

'391 also teaches that pressures near atmospheric (i.e., approximately 760 mmHg) are suitable for performing ultrasonic spraying. The selection of a known material or method based on its suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected a pressure of approximately 760 mmHg as the pressure of the ultrasonic spraying of '453 with a reasonable expectation of success because '391 recognizes the suitability of atmospheric pressure for ultrasonic spraying.

16. Claims 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tong '453 and in view of Evans (U.S. Patent 5,369,547, hereafter '547).

Claim 6: '453 is described above. It teaches that the oxide has high surface area (col. 4, lines 1-9) for use in a capacitor (col. 1, lines 15-20), but does not quantitatively specify the area. Thus, it does not teach a surface area of 10 to 1500 m^2/gram.

'547 also teaches the formation of a porous ruthenium oxide film via the pyrolysis of a ruthenium precursor on a heated substrate (col. 6, lines 36-54) for use in a capacitor (col. 1, lines 5-10). '547 teaches that the surface area of the oxide coating is up to about 120 square meters/g (col. 7, lines 19-22). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the film of '453 with a surface area of 120 m^2/g because '453 indicates that it desires a high surface area film ruthenium oxide film for use in a capacitor, and because '547 indicates that 120 m^2/g is a useful surface area for ruthenium oxide films for use in capacitors. The selection of a known material or method based on its suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Claim 17: '453 does not explicitly teach that the electric conductivity of the metal surface is increased before applying the porous metal oxide coating. '547 teaches that the surface conductivity of the substrate may be improved before coating via the method of U.S. Patent 5,098,485 to ensure good electrical contact between the substrate and the coating (col. 6, lines 65-68). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have increased the electrical conductivity of the substrate of '453 before

having applied the porous coating because '547 indicates that such treatment would have ensured good electrical contact between the metal substrate and the porous oxide coating for use in a capacitor.

Double Patenting

17. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

18. Claims 1-19 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 4-15 and 18-21 of U.S. Patent No. 6,224,985. (Tong '453 is cited as evidence regarding claim 16.) Although the conflicting claims are not identical, they are not patentably distinct from each other because present claim 1 is wholly encompassed by patented claim 4. The difference between the claims is that patented claim 4 requires that at least some ruthenium oxide be present whereas the current claim 1 is open to the possibility that no oxide is present. It would have been obvious to one of ordinary skill in the art at the time the invention was made, when forming the product of '985, claim 4 to have formed the product of instant claim 1 because it would have been necessary to have done so.

Claims 2-3: Patented claim 4 is open to the possibility that some of the precursor remains unreacted. The precursor may be a nitrate (claim 5).

Claims 5-15 and 17-19: The features of current claims 5-15 and 17-19 can be found in patented claims 6-15 and 18-21.

Claim 16: Patented claim 18 teaches plasma etching, but does not explicitly claim plasma cleaning. However, '453, col. 6, lines 23-32 notes that plasma etching inherently cleans the substrate.

19. Claims 1-2 and 18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 2 of copending Application No. 10/290598. Although the conflicting claims are not identical, they are not patentably distinct from each other because '598, claim 2, requires that at least some ruthenium oxide be present whereas the current claim 1 is open to the possibility that no oxide is present. It would have been obvious to one of ordinary skill in the art at the time the invention was made, when forming the product of '598, claim 2 to have formed the product of instant claim 1 because it would have been necessary to have done so.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented. The Examiner notes that Applicant has elected the method claims (4-26) in '598, but that the product claims are still present.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (703) 308-2331. The examiner can normally be reached on 8-5:30 M-F, with alternate Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 306-3186 for regular communications and (703) 306-3186 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Michael Cleveland
Patent Examiner
June 26, 2003